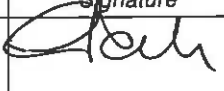









 CARLO GAVAZZI SPACE SpA	AMS02-TCS
---------------------------------------------------------------------------------------------------------------------	-----------

Tipo Doc.: PROCEDURE Doc. Type:		N° DRD: DEL 080 DRD N°:	
N° Doc.: AMSTCS-PR-CGS-022 Doc. N°:	Ediz.: 1 Issue:	Data: 17/12/2008 Date:	Pagina 1 Di 8 Page Of
Titolo : AMS02 MLI HANDLING, PACKING, TRANSPORT PROCEDURE Title :			


	Nome & Funzione Name & Function	Firma Signature	Data Date	LISTA DI DISTRIBUZIONE DISTRIBUTION LIST	N	A	I
Preparato da: Prepared by:	Vettore C. (DT/MT)		17.12.2008	Interna / Internal Lorenzi P. 1 X Villa M. (PA/QA) 1 X Dell'Acqua A. 1 X			
Approvato da: Approved by:	Cinquepalmi C. (PA/CC) Cremonesi L. (PA/QA) Molina M. (DT/MT) Vettore C. (DT/MT)	   	22.12.08 17.12.08 17-12-2008 17.12.2008				
Applicazione autorizzata da: Application authorized by:	Olivier M. (DT/MT)		17.12.2008	Esterna / External E. Russo (ASI) 1 X			
Customer / Higher Level Contractor							
Accettato da: Accepted by:	ASI						
Approvato da: Approved by:	ASI						

N=Numero di copie A=Applicazione I=Informazione
 N=Number of copy A=Application I=Information

Gestione documenti: Data Management:	 Firma / Signature	17.12.08 Data / Date	File: AMSTCS-PR-CGS-022_Issue1.doc
-----------------------------------------	----------------------------------------------------------------------------------------------------------	-------------------------	------------------------------------

 CARLO GAVAZZI SPACE SpA	<h1>AMS02-TCS</h1>	N° Doc: AMSTCS-PR-CGS-022 Doc N°:	
	AMS02 MLI HANDLING, PACKING, TRANSPORT PROCEDURE	Ediz.: 1 Issue:	Data: 17/12/2008 Date:
		Pagina 2 Page	di 8 of

REGISTRAZIONE DELLE MODIFICHE / <i>CHANGE RECORD</i>			
EDIZIONE <i>ISSUE</i>	DATA <i>DATE</i>	AUTORIZZAZIONE <i>CHANGE AUTHORITY</i>	OGGETTO DELLA MODIFICA E SEZIONI AFFETTE <i>REASON FOR CHANGE AND AFFECTED SECTIONS</i>
1	17/12/08		FIRST ISSUE

 CARLO GAVAZZI SPACE SpA	<h1>AMS02-TCS</h1>	N° Doc: AMSTCS-PR-CGS-022 Doc N°:	
	AMS02 MLI HANDLING, PACKING, TRANSPORT PROCEDURE	Ediz.: 1 Issue:	Data: 17/12/2008 Date:
		Pagina 3 Page	di 8 of

LISTA DELLE PAGINE VALIDE / LIST OF VALID PAGES									
PAGINA PAGE	EDIZIONE ISSUE	PAGINA PAGE	EDIZIONE ISSUE	PAGINA PAGE	EDIZIONE ISSUE	PAGINA PAGE	EDIZIONE ISSUE	PAGINA PAGE	EDIZIONE ISSUE
1 - 8	1								
Annex A A1 to A12	1								

 CARLO GAVAZZI SPACE SpA	AMS02-TCS		N° Doc: AMSTCS-PR-CGS-022 Doc N°:	
	AMS02 MLI HANDLING, PACKING, TRANSPORT PROCEDURE		Ediz.: 1 Issue:	Data: 17/12/2008 Date:
			Pagina 4 Page	di 8 of

TABLE OF CONTENT

1.	SCOPE	5
2.	DOCUMENTS.....	6
2.1	APPLICABLE DOCUMENTS	6
2.2	REFERENCE DOCUMENTS	7
3.	HANDLING, PACKING AND TRANSPORT PROCEDURE	8
	ANNEX-A : HANDLING PROCEDURE FOR THERMAL HARDWARE (QSTD-MPRC-3031-AAE ISSUE 1.0)	8

 CARLO GAVAZZI SPACE SpA	AMS02-TCS		N° Doc: Doc N°:	AMSTCS-PR-CGS-022	
	AMS02 MLI HANDLING, PACKING, TRANSPORT PROCEDURE		Ediz.: Issue:	1	Data: Date: 17/12/2008
			Pagina Page	5	di of 8

1. SCOPE

This documents defines the requirements and procedure for the handling, packing and transport of thermal blankets and foils and related small parts used on the AMS-02 payload.

The thermal blankets will be used in conjunction with the thermal control system (TCS) to protect AMS-02 components from temperature extremes.

The Thermal Blankets are a very delicate hardware, have been manufactured to very high quality standards and represent a considerable value. Therefore these items must be treated with utmost care and packed when not in use.

During the processes described in this procedure attention must be paid to avoid the damages listed below:

- contamination
- scratches on the surfaces/coatings
- mechanical damages in the foils/groundings

This document corresponds to the contract deliverable DEL 080

 CARLO GAVAZZI SPACE SpA	AMS02-TCS		N° Doc: AMSTCS-PR-CGS-022 Doc N°:
	AMS02 MLI HANDLING, PACKING, TRANSPORT PROCEDURE		Ediz.: 1 Data: 17/12/2008 Issue: Date: Pagina 6 di 8 Page of

2. DOCUMENTS

Documents here below identified are applicable and/or reference for the activities described in the present document and are considered part of it to the extent specified herein.

2.1 APPLICABLE DOCUMENTS

The documents listed here below are applicable to the present proposal for the extent recalled on it:

CONTRACTUAL

- AD1 Capitolato generale ASI, available on http://www.asi.it/html/norme/cap_gen.pdf
- AD2 Richiesta d'offerta per Programma AMS, attività di Fase C/D – Prot. ASI 006194 – 25/07/2007
- AD2bis Capitolato Tecnico "Progetto: AMS Attività di fase C/D" Doc. N. DC-IPC-2007-062
- AD3 Tailoring di primo livello delle norme ECSS, serie M-E-Q – Progetto AMS attività di fase C/D- Doc. n° DC-IPC-2007-063 Rev. A

MANAGEMENT

- AD4 "ECSS Glossary" – Doc. ECSS-P-001 Rev. B

PRODUCT ASSURANCE

- AD5 "Product Assurance Requirements - Progetto AMS attività di fase C/D "-Doc. n° DC-IPC-2007-064 Rev. A
- AD6 "Istruzione Operativa "Norme per la redazione del Piano di Assicurazione del Prodotto (PA Plan)", Doc. OP-IPC-2005-008
- AD7 "Sistemi di Gestione per la Qualità", doc. UNI EN ISO 9001:2000
- AD8 "Quality Management Plan for the Alpha Magnetic Spectrometer 02 (AMS-02) Experiment", Doc. JSC63164, Basic Version, 09/21/2005
- AD9 "Master Verification Plan (MVP)", Doc. JSC 29788, Iss. Draft, 8/21/2006
- AD10 "PA REQUIREMENTS DC-IPC-2007-064 RevA Conformity", doc AMSCD-RQ-CGS-001 issue 1
- AD11 "PA Plan", doc AMSCD-PL-CGS-001 issue 1 , dated February 4th 2008

ENGINEERING AND TECHNICAL

- AD11 "Multi-Layer Insulation for the Alpha Magnetic Spectrometer Guidelines", Doc. CTSD-SH-1782, 9/30/2005
- AD12 "AMS-02 Structural Verification Plan for the Space Transportation System and the International Space Station", Doc. JSC28792, Iss.D, March 2005
- AD13 "Experiment/Payload Integration Hardware Interfaces - Part I", Doc. JSC29095, Iss.A, 06/01/2002
- AD14 "Experiment/Payload Integration Hardware Interfaces - Part II", Doc. JSC29095, Iss.A, August 2004
- AD15 "Experiment/Vacuum Case Payload Integration Hardware Interface", Doc. JSC29202, Iss.C, March 2005

 CARLO GAVAZZI SPACE SpA	AMS02-TCS		N° Doc: Doc N°: AMSTCS-PR-CGS-022
	AMS02 MLI HANDLING, PACKING, TRANSPORT PROCEDURE		Ediz.: 1 Data: 17/12/2008 Issue: Date:
		Pagina 7 di 8 Page of	

AD16 "AMSTCS-SP-CGS-003", AMS-02 THERMAL REQUIREMENTS SPECIFICATION DOCUMENT, Iss.1, March 25st 2008

AD17 "Attached Payload Interface Requirements Document", Doc. SSP 57003, Iss. B, 17/06/03

AD18 "Attached Payload Hardware Interface Control Document, Doc. SSP 57004, Iss. B, 13/06/03

2.2 REFERENCE DOCUMENTS

[DR 1] Phase II Flight Safety Data Package for the Alpha Magnetic Spectrometer - 02 (AMS-02) Version Basic JSC49978, 2006

[DR 2] Alpha Magnetic Spectrometer – 02 Assembly and Testing Integration Plan, Version A, JSC63123, 28-11-2005

[DR 3] Dichiarazione INFN sulla consegna di componenti – lettera del 20 maggio 2007 (prot. ASI n. 0009869)

[DR 4] Capitolato gestionale ASI OP-IPC-2005-010-E

[DR 5] "TRACKER BOTTOM MLI ADP", AMSC-DP-0001-AAE, October 24th, 2007

[DR 6] "XPD/CRATES INTERNAL MLI ADP", AMSC-DP-0002-AAE, July 14th, 2008

[DR 7] "AMS-02 LATE MLI – BRICKS MLI ADP", A2LM-DP-0001-AAE, October 28th, 2008

[DR 8] "AMSTCS-TN-CGS-014", AMS-02 MLI DESCRIPTION REPORT, Iss.1, March 31st 2008


[DR 9] "AMSTCS-PR-CGS-011", MLI INTEGRATION REQUIREMENT SPECIFICATIONS (VERIFICATION CRITERIA) AND INTEGRATION PROCEDURE, Iss2, December 15th 2008

 CARLO GAVAZZI SPACE SpA	AMS02-TCS		N° Doc: Doc N°:	AMSTCS-PR-CGS-022	
	AMS02 MLI HANDLING, PACKING, TRANSPORT PROCEDURE		Ediz.: Issue:	1	Data: Date: 17/12/2008
			Pagina Page	8	di of 8

3. HANDLING, PACKING AND TRANSPORT PROCEDURE

The AMS02 blankets handling, packing and transport procedure is contained in the following Annex:

ANNEX-A : HANDLING PROCEDURE FOR THERMAL HARDWARE (QSTD-MPRC-3031-AAE ISSUE 1.0)

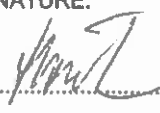


 CARLO GAVAZZI SPACE SpA	AMS02-TCS		N° Doc: AMSTCS-PR-CGS-022 Doc N°:	
	AMS02 MLJ HANDLING, PACKING .TRANSPORT PROCEDURE		ANNEX A Ediz.: 1 Data: 17/12/2008 Issue: Date: Pagina A1 di A12 Page of	

ANNEX A – HANDLING PROCEDURE FOR THERMAL HARDWARE (QSTD-MPRC-3031-AAE issue 1.0)

THERMAL HARDWARE

Handling Procedure for Thermal Hardware

DRL: -
CI-No.: -

NAME:	FUNCTION:	SIGNATURE:	DATE:
Prepared: W. Hoidn	Engineering		18.4.00
Checked: C. Ranzenberger	Engineering		18.4.00
Approved: E. Prechelmacher	Project Management		18/04/2000

Document No: **QSTD-MPRC-3031-AAE**Issue No: **1.0**Issue Date: **18 Apr 2000**DRL: **-**CI-No: **-****Distribution:**Internal: **RAN, STI, HOI, PRE (c)**External: **-****Number of pages of main document** (incl. cover pages, excl. annexes etc.): **11****Number of pages attached** (annexes etc.): **-****Document Change Log:**

Issue	Date	Modified Pages	Description
1.0	18 Apr 2000		Initial Issue (supersedes PRC-OR-3735/Iss. 1)

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 SCOPE	1
1.2 ACRONYMS	1
2. DOCUMENTS	2
2.1 APPLICABLE DOCUMENTS	2
2.2 REFERENCE DOCUMENTS	2
3. PRE-CONDITIONS	3
3.1 PERSONNEL	3
3.2 ENVIRONMENTAL CONDITIONS	3
3.3 MATERIALS AND EQUIPMENT	3
3.3.1 Handling Equipment	3
3.3.2 Packing Materials and Equipment	4
4. OPERATING INSTRUCTIONS	5
4.1 HANDLING OF MLI	5
4.1.1 Handling Measures	5
4.1.1.1 Thermal Blankets and Foils	5
4.1.1.2 Bonding Leads	6
4.1.1.3 Velcros	6
4.1.2 Cleanliness	6
4.2 PACKING INSTRUCTIONS	7
4.2.1 Cleaning of Container	7
4.2.2 Packing Materials	7
4.2.3 Packing and Unpacking of the Hardware	8
4.2.4 Storage	8
4.2.5 Inspection	8

1. INTRODUCTION

1.1 SCOPE

This procedure is applicable for handling, packing and transport of Thermal blankets and foils and related small parts.

The Thermal Blankets are a very delicate hardware, have been manufactured to very high quality standards and represent a considerable value. Therefore these items must be treated with utmost care and packed when not in use.

During the processes described in this procedure attention must be paid to avoid the damages listed below:

- contamination (both particular and molecular)
- scratches on the surfaces/coatings
- mechanical damages in the foils/groundings

1.2 ACRONYMS

AAE..... Austrian Aerospace Ges.m.b.H.
acc. according
AD..... Applicable Documents
ADP Acceptance Data Package
AIV..... Assembly, Integration, Verification
CIDL..... Configuration Item Data List
e.g. for example
etc. and-so-on
i.e. this means
IPA Isopropylalcohol
MLI..... Multi Layer Insulation
MRB..... Material Review Board
N/A..... Not Applicable
NCR..... Non Conformance Report
NVR Non Volatile Residue
ITO..... Indium Tin Oxide
para. paragraph
ppm..... parts per million
PSA..... Pressure Sensitive Adhesive
QA..... Quality Assurance
RD Reference Document
TBC To Be Confirmed
TBD To Be Defined
T/H..... Thermal Hardware
VDA..... Vacuum Deposited Aluminum

2. DOCUMENTS

The following documents form part of this document to the extent specified here-in.

In the event of a conflict between this document and the Applicable Documents (AD), the AD shall have the precedence. In the event of a conflict between this document and a Reference Document (RD), this document shall have precedence.

Any such conflict should however be brought to the attention of AAE for resolution.

This document has been established based on the issues of ADs and RDs as given below. Issue changes of ADs and RDs will lead to an update of this document only in case of impacts on its content.

However, the valid documentation status is reflected in the relevant Configuration Item Data List (CIDL).

2.1 APPLICABLE DOCUMENTS

none

2.2 REFERENCE DOCUMENTS

RD1	PRC-OR-3706	Handhabungsvorschriften für Superisolationsmatten (Handling procedure for MLI; AAE internal procedure)
-----	-------------	-----------------------------------------------------------------------------------------------------------------

3. PRE-CONDITIONS

3.1 PERSONNEL

Handling and Packing of thermal blankets/foils and related hardware shall only be performed by experienced personnel or under supervision of experienced personnel. The cleanroom procedure of the relevant cleanroom must be followed, and the use of clean gloves as described in para. 3.3.1 is mandatory. The use of an appropriate face mask is recommended when handling cleanliness critical items.

3.2 ENVIRONMENTAL CONDITIONS

Handling and Packing of thermal blankets and foils may only take place in cleanrooms which are compliant to the following requirements:

1. Cleanroom Class: better than 100.000 (acc. Fed. Std. 209E)
2. Relative Humidity: $50\% \pm 10\%$
3. Temperature: $22^{\circ}\text{C} \pm 3^{\circ}\text{C}$

3.3 MATERIALS AND EQUIPMENT

In the para's. below the min. necessary materials/equipment are listed, which are required to carry out the processes described in para. 4 below:

3.3.1 Handling Equipment

As a minimum the personnel handling the MLI blankets have to wear:

- Protective, cleanroom aproved clothing
- Gloves: clean lint free gloves or LATEX gloves must be used for handling of Thermal Hardware

3.3.2 Packing Materials and Equipment

For proper packing of thermal hardware the following materials have to be provided as a minimum:

- Inner Packing: Clear clean Mylar (Wrapping)
- Outer Packing: Polyethylene
- Tapes: Flashbreaker 1 Tape or equivalent
- Humidity indicator: Südchemie (Köln)
No. 6685-12-194-4969
range between 20% and 80% RH in steps of 10%
- Dessiccant

4. OPERATING INSTRUCTIONS

4.1 HANDLING OF MLI

The thermal hardware is of high engineering quality and costs and the repairability is limited. Replacement of damaged hardware is very expensive and hardly available in time. Therefore all thermal hardware is to be handled with care appropriate for space applications at any time.

4.1.1 Handling Measures

This para. describes all necessary measures to be taken into account in order to maintain the thermo-optical, electrical and mechanical properties of MLI within acceptable limits during all phases of handling.

4.1.1.1 Thermal Blankets and Foils

To prevent the sensitive surfaces from being scratched, the foils shall not glide one on another or on the table. By applying appropriate care, touching, rubbing or tearing of the blankets on equipment in the cleanroom is to be avoided.

Scratching or contamination of these coatings would have negative influence on the insulation properties and is therefore to be avoided.

Thermal blankets and foils (in particular 3-dimensional shaped ones) shall not be bent, folded or deformed unduely to protect the foils and their brittle coatings.

Never use extensive force (especially during integration).

In order to avoid electro-statical charging of the (external) surfaces, all electrically conductive layers/coatings are grounded to the structure using grounding leads.

The electrically conductive and invisible ITO-coating often used on the outermost Kapton-layer is a very thin and brittle film.

Scratching and folding of ITO-coated Kapton-layers as well as in-appropriate handling of the grounding leads would impair the electrical properties and has therefore to be avoided.

4.1.1.2 Bonding Leads

Most thermal blankets and foils are equipped with bonding leads. For weight saving reasons those grounding leads as well as their attachment to the foils is susceptible to mechanical damage.

Therefore the thermal blanket is never to be picked up or held on the grounding leads. The grounding leads must not be unduely bent or folded.

In order to keep the grounding lead from being caught by cleanroom equipment, from touching the ground and from scratching the sensitive surfaces of the foils, it is rolled to a diameter of approx. 60 mm, when not being attached to the spacecraft.

4.1.1.3 Velcros

Velcros are attachment elements consisting of a loop and a hook part. In order to avoid damage of the thermal hardware at velcro locations during removal from the spacecraft, the MLI must be held very close to the velcro which is being opened. Opened velcros can be covered with an appropriate (e.g. Mylar) foil, to avoid their re-connecting during opening of other velcros. Tearing on the MLI blanket edges only (with the force required to open all velcro connections) may result in tears in the MLI and is therefore not allowed.

4.1.2 Cleanliness

The cleanliness of thermal hardware is essential for its function. Therefore these items are manufactured, integrated, checked and handled under clean conditions.

In case of contamination, the cleaning of perforated foils is only possible on small, local areas and using lint-free, soft cleanroom cloth with IPA. Due to the sensitivity of the coated, perforated foils, a general cleaning of MLI is not recommended.

The thermal blankets are to be protected against contamination by particles or fluids/greases. They may only be handled by personnel wearing gloves as specified in para. 3.3.1. If the gloves leave spots on the foils, they have to be replaced immediately by new ones.

All equipment (tables etc.), which come in direct contact with the foils, must be appropriately clean.

The relevant cleanroom procedure has to be followed.

4.2 PACKING INSTRUCTIONS

4.2.1 Cleaning of Container

***NOTE:** Cleaning activities on the container must not start before all blankets are safely wrapped.*

Isopropanol alcohol is the selected cleaning medium for the container, both internally and externally. Lint-free cloth must be used.

Although the seal in the container rim is capable of coming into contact with the cleaning medium, it should not be saturated with such.

The container shall be located close to the airlock in a pre-cleaned environment and shall be cleaned thoroughly internally and externally.

***NOTE:** The container must always be closed when no loading/unloading activity is in progress.*

After cleaning has been performed, washing of hands is obligatory, and the container should be left open for 5 minutes to allow for evaporation of cleaning agent.

4.2.2 Packing Materials

It is generally possible to re-use the packing material; damaged packing foils must be replaced with new ones (for materials see para. 3.3).

Each thermal blanket is first wrapped in clear mylar. Then it is packed in a polyethylene outer bag.

The humidity indicator and desiccants (min. 6 units per m² polyethylene foil) are added and finally the polyethylene outer bag is sealed.

Each outer bag will be provided with a label at least containing the part number of the blankets included.

4.2.3 Packing and Unpacking of the Hardware

All thermal blankets and foils shall be packed in a reuseable container designed to provide sufficient protection of the thermal hardware.

Stacking of blankets is acceptable, if the foils are separated by spacer netting.

Blankets without spacer netting ("embossed" or "crinkled" foils) shall not be compressed to avoid flattening of the foils, which would reduce the thermal performance.

This type of MLI shall be separated by drawers or the polyethylene bag (used as outer packing of blankets) shall include a certain amount of air (compressed with a flat plate, there shall be a distance of 1 cm between the top of the MLI and the plate) to avoid compressing of the blankets due to stacking of the bags during transport and storage.

***NOTE:** A minimum bending diameter of 50 mm shall be ensured, if folding of blankets is necessary. Bending of ITO coated blankets shall be avoided whenever possible, because of the brittle coating.*

Before loading of the container, place a layer of polyethylene into the empty container such, that the polyethylene can be folded over the packed MLI blankets.

Once the last blanket has been loaded into the container, close the protective polyethylene and fix it with tape.

4.2.4 Storage

For short-term laying down of thermal blankets (i.e. storage time shorter than 1 working day) the relevant insulation item has to be put on a clean area and to be immediately covered by clean, clear mylar foils whenever not in use.

If the foreseen storage time exceeds the short-term period, the respective insulation item has to be packed in accordance with para. 4.2.3 and stored.

4.2.5 Inspection

Each time hardware items are placed into their respective protection bags, they should be visually inspected for any signs of damage.